Vacuum Metallurgy

Card 4/丸5

Vacuum Metallurgy   SOV/6270

Card 5/ℵ₅

POBEGAYLO, V.M.(Moskva); SAMARIN, A.M.(Moskva); KHLIEBNIKOV, A.Ye. (Moskva)

Desulfuration of open-hearth converter iron by lime mixture in vacuum.
Izv. AN SSSR.Otd.tekh.nauk. Met. i topl. no.5:17-21 S-O'62.

(MIRA 15:10)

(Steel—Metallurgy)   (Desulfuration)

VOLKOV, S.Ye.(Moskva); MCHEDLISHVILI, V.A. (Moskva); SAMARIN, A.M. (Moskva)

Wettability of corundum and silica glass by iron-silicon melts.
Izv. AN SSSR.Otd. tekh.nauk. Met. i topl. no.5:69-73 S-0 '62.

(MIRA 15:10)

(Liquid metals)   (Surface tension)

BURTSEV, V. T. (Moskva); KARASEV, R. A. (Moskva); SAMARIN, A. M. (Moskva)

Mechanism of evaporation and the pressure of sulfur vapors
on iron-carbon-sulfur melts. Izv. AN SSSR. Otd. tekh. nauk.
Met. i topl. no.6:32-36 N-D '62.   (MIRA 16:1)

(Iron—Metallurgy)   (Desulfuration)
(Vapor pressure)

VERTMAN, A. A. (Moskva); SAMARIN, A. M. (Moskva); FILIPPOV, Ye. S.
(Moskva)

Viscosity and the electrical conductivity of liquid nickel-
carbon alloys. Izv. AN SSSR. Otd. tekh. nauk. Met. i topl.
no.6:37-42   N-D '62.   (MIRA 16:1)

(Nickel alloys—Electric properties)
(Viscosimetry)

AVERIN, V.V.; CHERKASOV, P.A.; SAMARIN, A.M.

Deoxidation of nickel melts. Issl. po zharopr. splav. 9:204-218
'62.   (MIRA 16:6)
                        (Nickel—Metallurgy)

LEVENETS, N.P.; POBEGAYLO, V.M.; SAMARIN, A.M.; KHLEBNIKOV, A.Ye.

Experiments in oxygen blowing of Khalilovo cast iron. Trudy Inst.
met. no.11:31-35 '62.   (MIRA 16:5)
   (Khalilovo—Cast iron) (Oxygen—Industrial applications)

S/509/62/000/011/001/019
E071/E351

AUTHORS: Averin, V.V., Cherkasov, P.A. and Samarin, A.M.

TITLE: Deoxidation of nickel alloys

SOURCE: Akademiya nauk SSSR. Institut metallurgii. Trudy.
              no. 11. Moscow, 1962. Metallurgiya, metallovedeniye,
              fiziko-khimicheskiye metody issledovaniya. 36 - 53

TEXT: The influence of deoxidizing elements (cobalt, iron,
chromium, manganese, vanadium, silicon, carbon, titanium and
aluminum) on the solubility and activity of oxygen in liquid nickel
was investigated. Equilibrium was established between the liquid
metal, the oxide phase and an argon-hydrogen-steam mixture of known
composition. The experimental melts (100 - 130 g) were effected
in a high-frequency furnace, using zirconia or alumina crucibles;
the temperature was meadured to $\pm$ 10 $^{\circ}$C; sampling was by a silica
tube without disturbing the composition of the gaseous phase. The
activities of the deoxidizing elements in nickel melts were calcu-
lated. Generally, the activity of deoxidizing elements in nickel
decreases more than in iron; this is confirmed by data on heats
of formation of compounds of the type Ni_xR_y and Fe_xR_y
Card 1/2

Deoxidation of nickel alloys
S/509/62/000/011/001/019
E071/E551

(where R - deoxidizing element). The influence of deoxidants on
the activity of oxygen in liquid metal was studied, the data obtained
for nickel being compared with those for iron. The greater
deoxidizing power of the deoxidants in liquid nickel (compared with
iron) is in accordance with their greater effect on the activity
of the oxygen in the melt. A relationship was shown to exist
between the decrease in the activity of the oxygen and its minimum
solubility in the melt. A decrease in the activity of the oxygen
in a melt, due to stronger bonds between the oxygen and the
deoxidizing agent, leads to an increase in the concentration of
oxygen in the Me-R melt compared with the pure metal in equilibrium
with an atmosphere of the same oxygen potential. However, the
value of the oxidizing potential decreases to a greater extent,
causing a sharp decrease in the oxygen content at low concentrations
of a deoxidizing element. Above a certain deoxidant concentration
a position is reached where the effect of the powerful oxygen
bonding is so strong that increasing amounts of deoxidant cause an
increase in the oxygen content of the melt, in spite of the
decrease in oxygen potential of the gas phase. There are 8 figures.
Card 2/2

CHERKASOV, P.A.; AVERIN, V.V.; SAMARIN, A.M.

   Deoxidation by manganese of magnetically soft alloys on an iron
   and nickel base. Trudy Inst. met. no.11:54-64 '62.   (MIRA 16:5)
        (Iron-nickel alloys--Metallurgy) (Manganese)

KONDRAT'YEV, A.I.; SAMARIN, A.M.

    Effect of oxygen on the desulfuration of liquid steel. Izv.vys. ucheb.
    zav.; chern. met. 5 no.9:99-104 '62.   (MIRA 15:10)

    1. Moskovskiy institut stali i splavov.
        (Desulfuration)   (Oxygen--Industrial applications)

BURTSEV, V.T.; SAMARIN, A.M.

Pressure of saturated vapors of liquid metals and their impurities investigated by the carrying gas method. Zav.lab. 28 no.10:1199-1203 '62. (MIRA 15:10)

1. Institut metallurgii imeni A.A. Baykova.
       (Liquid metals)   (Vapor pressure)

SAMARIN, A.M., otv. red.; CHERNOV, A.N., red. izd-va; MAKUNI, Ye.V.,
        tekhn. red.; ASTAF'YEVA, G.A., tekhn. red.

   [Transactions of the conference on the Use of Vacuum in Metal-
   lurgy] Trudy Soveshchaniia po primeneniiu vakuuma v metallurgii.
   3d, Moskva, Izd-vo AN SSSR, 1963. 254 p.   (MIRA 16:9)

   1. Soveshchaniye po primeneniyu vakuuma v metallurgii. 3d.
   2. Chlen-korrespondent AN SSSR (for Samarin).
                   (Vacuum metallurgy)

VOLKOV, S.Ye. (Moskva); SAMARIN, A.M. (Moskva)

Effect of the deoxidation of steel by aluminum on the process
of its desulfuration. Izv. AN SSSR. Otd. tekh. nauk. Met. i
gor. delo no.2:22-27 Mr-Ap '63.   (MIRA 16:10)

AVERIN, V.V. (Moskva); GARNYK, G.A. (Moskva); SAMARIN, A.M. (Moskva)

Thermodynamic conditions for the interaction between nitrogen
on one hand and silicon and aluminum on the other, in transformer
steel. Izv. AN SSSR. Otd. tekh. nauk. Met. i gor. delo no.2:
40-46 Mr-Ap '63.   (MIRA 16:10)

L 13597-63   EWP(q)/EWT(m)/BDS AFFTC/ASD   JD
ACCESSION NR: AP3002387   S/0279/63/000/003/0076/0082

AUTHOR: Afanas'yev, Yu. M. (Moscow); Linchevskiy, B. V. (Moscow); Polyakov,
A. Yu. (Moscow); Samarin, A. M. (Moscow)

TITLE: Use of slag for steel desulfurization in vacuum induction furnaces

SOURCE: AN SSSR. Izv. Otd. tekhnicheskikh nauk. Metallurgiya i gornoye delo,
no. 3, 1963, 76-82

TOPIC TAGS: induction melting, vacuum, nitrogen atmosphere, high-carbon steel,
medium-carbon steel, low-carbon steel, desulfurization, synthetic slag, ferrous
oxide content, optimum holding time

ABSTRACT: In order to determine the feasibility of deep desulfurization of
steel in a vacuum induction furnace with highly desulfurizing synthetic slag,
several steels containing 0.035, 0.41, and 1.19% C and from 0.09 to 0.128% S
were treated with two synthetic slags. One slag contained 53.8% CaO, 6.6% SiO$_2$,
40.3% Al$_2$O$_3$, and 0.32% FeO; the other slag, 60.4% CaO, 28.8% SiO$_2$, 10.9% Al$_2$O$_3$,
and 0.06% FeO. Three variants of treatment were tested: without synthetic
slag, vacuum with synthetic slag, and nitrogen atmosphere at 1.1 atm with synthetic

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ACCESSION NR: AP3002387

slag. The slag (6—10 wt% of the metal charge) was put on the crucible bottom under the metal charge; the molten metal was held under liquid slag for 30—50 min at 1600—1700C in a vacuum of 0.05—1.0 mm Hg. Test results showed that regardless of the carbon content, the desulfurizing effect of vacuum alone is very low. Treatment with synthetic slag in combination with nitrogen atmosphere or vacuum reduced the sulfur content in the high-carbon (1.19% C) steel from about 0.2 to 0.02% within the first 15—20 min of the holding time, with practically no change after longer holding. In medium-carbon (0.41% C) or low-carbon (0.035% C) steel, a sharp drop in the sulfur content from 0.12 to 0.01% or even less occurred in the first 10 min, followed by a slight reverse influx of sulfur into the metal during prolonged holding. The different effect of the furnace pressure on desulfurization of low-, medium-, and high-carbon steels is associated with the effects of the FeO content in the slag. The lower the FeO content, the lower the sulfur content in the metal bath. However, in melting steels with a carbon content over 1% the FeO content of the slag does not depend much on the furnace pressure; while in melting low-carbon steels deeper vacuum results in a lower FeO content. The desulfurizing effect of other slag components is much weaker that that of FeO. The highest desulfurization (77% for low-carbon and

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L 13597-63
ACCESSION NR: AP3002387

95% for high-carbon steel) was achieved by vacuum melting under a
synthetic slag. Melting under a synthetic slag in nitrogen resulted in a desul-
furization of 13% for low-carbon and 84% for high-carbon steel, while vacuum
melting without a slag reduced the sulfur content by 11 and 23% for the low-
and high-carbon steels, respectively. The optimum holding time should not
exceed 15—25 min. Orig. art. has: 6 figures, 4 formulas, and 1 table.

ASSOCIATION: none

SUBMITTED: 13Sep62   DATE ACQ: 12Jul63   ENCL: 00

SUB CODE: ML   NO REF SOV: 000   OTHER: 000

Card   3/3

SYUY TSZYA-LUN [Hsü Chia-lung] (Moskva); KASHIN, V.I. (Moskva);
    POLYAKOV, A.Yu. (Moskva); SAMARIN, A.M. (Moskva)

Thermodynamic properties of oxygen solutions in Ni-Cr and
Ni-Cr-C melts. Izv. AN SSSR. Met. i gor. delo no.5:58-63
S-O '63.   (MIRA 16:11)

MCHEDLISHVILI, V.A.; SAMARIN, A.M.

    Comparative evaluation of the rate of removal from liqu'd iron
    of oxide inclusions formed during the deoxidation by aluminum
    and silicon. Trudy Inst. met. no.14:29-49 '63.

                                              (MIRA 17:8)

    1. Chlen-korrespondent AN SSSR; otvetstvennyy redaktor zhurnala
    "Trudy Instituta metallurgii" (for Samarin).

AVERIN, V.V.; SAMARIN, A.M.

Effect of silicon on the solubility of oxygen in liquid cobalt
and in Co-Fe melts. Trudy Inst. met. no.14:50-57 '63.
(MIRA 17:8)

1. Chlen-korrespondent AN SSSR; otvetstvennyy redaktor zhur-
nala "Trudy Instituta metallurgii" (for Samarin).

AVERIN, V.V.; CHERKASOV, P.A.; SAMARIN, A.M.

Deoxidation of cobalt metls. Trudy Inst. met. no.14:58-67 '63
(MIRA 17:8)

1. Chlen-korrespondent AN SSSR; otvetsvennyy redaktor zhurnala
"Trudy Instituta metallurgii" (for Samarin).

ACCESSION NR: AT4009495   S/2509/63/000/014/0068/0077

AUTHOR: Banny*kh, O. A.; Zudin, L. F.; Kashin, V. L.; Prokoshkin, D. A.; Samarin, A. M.

TITLE: Properties of ferrite aluminum-iron alloys

SOURCE: AN SSSR. Institut metallurgii. Trudy*, no. 14, 1963. Metallurgiya, metallovedeniye, fiziko-khimicheskiye metody* issledovaniya, 68-77

TOPIC TAGS: aluminum alloy, iron alloy, aluminum-iron alloy, ferrite alloy, melting, forging, heat treatment

ABSTRACT: Some properties of aluminum-iron alloys are of industrial importance, but they are not commonly used as construction materials. In the present work a number of these alloys were exposed to melting, forging and heat treatment, after which they were studied for specific gravity, impact strength, rupture strength and plasticity under various conditions. The chemical composition of the alloys used in the investigation is given in Table 1 of the Enclosure. Two series of alloys were melted: one group in air and the other in a vacuum. It was found that vacuum melting of the alloy improves the mechanical properties, especially under high-temperature conditions. Figure 1 of the

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ACCESSION NR: AT4009495

Enclosure shows the dependence of the rupture strength and plasticity of the alloy on the aluminum content. The curves show that an increase in the aluminum content to about 15% increases the strength of the alloy between 20-600C; at 700C the strength does not depend on the aluminum content. The alloy has a maximum strength and satisfactory plasticity at 400C; the strength drops sharply and the plasticity simultaneously increases at temperatures over 600 C. Aluminum-iron alloys may thus be used under stress without adding a third element at temperatures below 600C. Figure 2 of the Enclosure shows that an increase in the aluminum content in the alloy increases grain size at 1,100C. Additional studies on the effect of admixtures (Ti, Zr, B, Ni, W) on the properties of the Al-Fe alloys shows that the introduction of titanium, zirconium, and boron into alloys with 10% Al does not change the strength of the alloy. Zirconium and boron lower the scaling resistance of the alloy while additions of nickel and tungsten to an alloy with 15% Al lowers the strength and plasticity of the alloy. Orig. art. has: 7 figures and 6 tables.

ASSOCIATION: Institut metallurgii, AN SSSR. (Metallurgical Institute, AN SSSR)

SUBMITTED: 00   DATE ACQ: 25Jan64   ENCL: 04

SUB CODE: MM   NO REF SOV: 006   OTHER: 011

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Alloy No.	Content %				
	Al	Mn	Si	O	N
Air-melted alloys					
1	4,87	0,023	0,032	0,0150	0,0048
2	9,80	0,094	0,065	0,0052	0,0090
7	8,70	0,010	0,047	0,0051	0,0040
8	12,70	0,005	0,046	0,0097	0,0090
9	15,00	0,018	0,013	0,0033	0,0090
Vacuum-melted alloys					
3	10,36	<0,010	0,030	0,0031	0,0110
4	12,19	<0,010	0,030	0,0048	0,0070
5	14,92	<0,010	0,030	0,0026	0,0070
6	16,82	<0,010	0,030	0,0020	0,0040

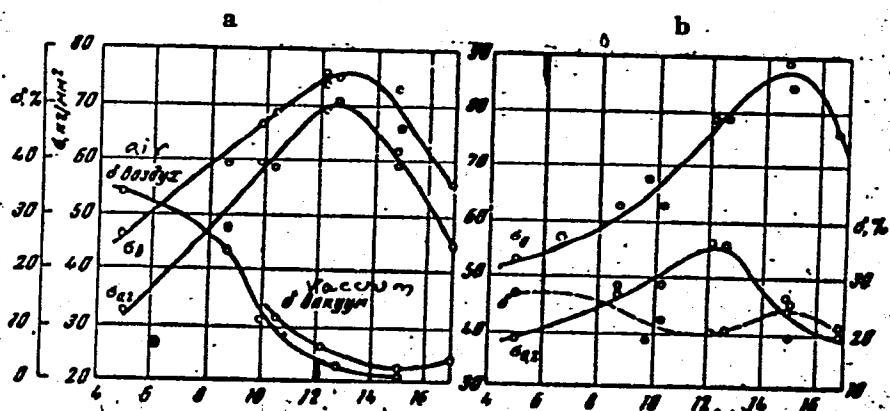TABLE 1 - Chemical composition of the alloys tested.

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Fig. 1 – Dependence of rupture strength and plasticity of alloys on aluminum content
a – at 20C; b – at 400C; c – at 500C; d – at 600 and 700C
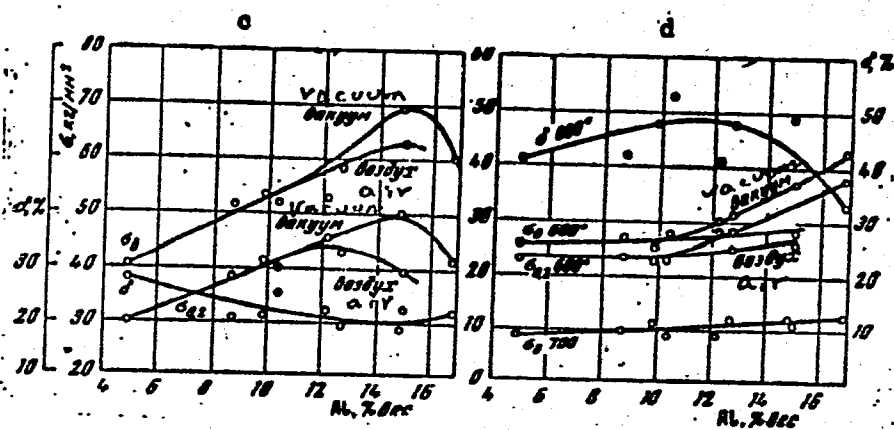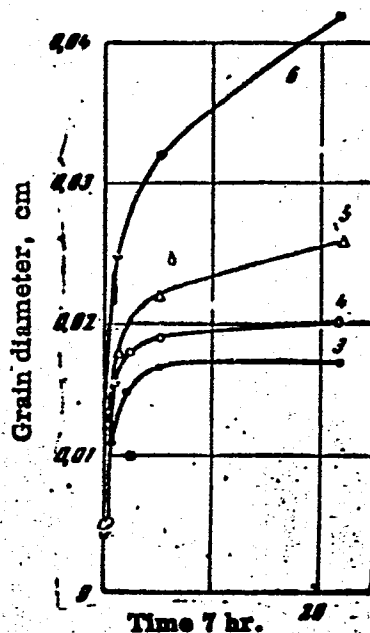
Card   4/6

Fig. 1 – Dependence of rupture strength and plasticity of alloys on aluminum content
a – at 20C; b – at 400C; c – at 500C; d – at 600 and 700C

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ACCESSION NR: AT4009495

Fig. 2 – The dependence
of the average grain
size on the duration of
treatment at 1,100C for
vacuum-melted alloys 3-6 –
alloy nos. (see Table 1
of the Enclosure)

Card   6/6

AVERIN, V. V.; SAMARIN, A. M.

Physical chemistry of the alloy deoxidation process. Archiv
hutn 8 no. 4: 283-299 '63.

1. Baikov Institute, Moskva.

STRUMILIN, S.G., akademik; SAMARIN, A.M.

Outstanding Russian scientist and engineer; the 80th birth-
day of I.P. Bardin. Vest. AN SSSR 33 no.12:90-92 D '63.
(MIRA 17:1)

1. Chlen-korrespondent AN SSSR (for Samarin).

VERTMAN, A.A.; SAMARIN, A.M.; FILIPPOV, Ye.S.

Phase diagram of Ni - C. Dokl. AN SSSR 148 no.2:342-343 Ja '63.
(MIRA 16:2)

1. Institut metallurgii im. A.A. Baykova. 2. Chlen-korrespondent
AN SSSR (for Samarin).
(Nickel-carbon alloys)

L 16989-63   EWP(q)/EWT(m)/BDS   AFFTC/ASD   Pq-4   WH/JD
                                    S/020/63/149/005/014/018   63

AUTHOR: Volkov, S. Ye., Mchedlishvili, V. A., and Corresponding Member of
           the Academy of Sciences USSR A. M. Samarin

TITLE: Wettability of corundum and quartz glass by iron-manganese compounds

PERIODICAL: Akademiya nauk SSSR. Doklady, v. 149 , no. 5, 1963, 1131-1133

TEXT: By determining the adhesion of molten ferromanganic alloys to
corundum and quartz glass, the authors attempted to evaluate the interphase
tension at the interface of the investigated systems. The determinations were
performed at 1,550°C by the sessile drop method in a helium atmosphere, using
iron containing 0.001-0.002% C, 0.002% S, 0.002% N, and traces of Si Cu, and Mn,
and electrolytic manganese containing not more than 0.1% impurities. It was
established that the surface tension of molten iron decreases with increasing
content of manganese. The adhesion of iron-manganese melts to corundum is lower
than to quartz glass, owing to the greater difference in the values of interphase
tension at the metal-oxide boundary, i.e., $\delta 1,2(SiO_2) \ll \delta 1,2(Al_2O_3)$. With in-
creasing content of manganese the adhesion of molten iron to corundum increases
owing to the preferential adsorption of manganese from the metallic solution to
the surface of the oxide. As the content of manganese increases, the adhesion
of iron-manganese melts to quartz glass at first increases but later decreases.
There is 1 figure.   Card 1/1
SUBMITTED: December 26, 1962

SAMARIN, A.M., otv. red.

[Investigating metals in the liquid and solid states;
80th anniversary of the birth of Academician Ivan
Pavlovich Bardin] Issledovaniia metallov v zhidkom i
tverdom sostoianiiakh; k 80-letiiu so dnia rozhdeniia
akademika Ivana Pavlovicha Bardina. Moskva, Izd-vo
"Nauka," 1964. 277 p.   (MIRA 17:7)

1. Moscow. Institut metallurgii im. A.A.Baykova. 2. Chlen-
korrespondent AN SSSR.

PROKOSHKIN, Dmitriy Antonovich; VASIL'YEVA, Yelena Valentinovna;
        SAMARIN, A.M., otv. red.

[Niobium alloys] Splavy niobiia. Moskva, Izd-vo "Nauka,"
1964. 330 p.   (MIRA 17:4)

1. Chlen-korrespondent AN SSSR (for Samarin).

L 17596-65   E;T(m)/T/EWP(t)/EWP(b)   IJP(c)   JD/HW   s/
ACCESSION NR AM4046729   BOOK EXPLOITATION

Samarin, A. M., ed. (Corresponding member, Academy of Sciences, U.S.S.R.)

Steel production; handbook (Staleplavil'noye proizvodstvo: spravochnik),
   Moscow, Izd-vo "Metallurgiya", 1964, 527 p. illus., biblio., tables.
   Errata slip inserted. 5,850 copies printed.

TOPIC TAGS: steel, ferroalloy, converter steel, open-hearth furnace,
electric furnace, vacuum metallurgy, steel teeming

PURPOSE AND COVERAGE: This handbook gives information on all the basic
problems (other than electrical engineering) of steel production: the theor-
etical principles of steelmaking processes, the technology of open-hearth,
electric furnace, and converter production, vacuum metallurgy, ferroalloy
production, furnace design, refractories, oxygen, economics, and the plan-
ning of steel production shops. The universal character of the handbook and
the volume of reference material makes it possible to recommend this publica-
tion as a valuable aid for engineers of the various specialties of metallurg-
ical plants, designers, and students at metallurgical institutes.

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L 17596-65
ACCESSION NR AM4046729

TABLE OF CONTENTS [abridged]:

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L 17596-65
ACCESSION NR AM4046729

SUB CODE: MM   SUBMITTED: 02Apr64   NR REF SOV: 265

OTHER: 138
Card 3/3

L 10733-65   EPA(s)-2/EWT(m)/EPF(n)-2/EWP(b)   Pt-10/Pu-4   WW/MJW/JD/JG/MLK

ACCESSION NR: AT4045992   S/0000/64/000/000/0034/0040

AUTHOR: Syuch, P.; Kashin, V. I.; Okorokov, G. N.; Samarin, A. M.
(Corresponding member AN SSSR)

TITLE: Effect of vacuum-arc melting on the quality of R18 high-speed
steel

SOURCE: AN SSSR. Institut metallurgii. Issledovaniya metallov v
zhidkom i tverdom sostoyaniyakh (Research of metals in liquid and
solid states). Moscow, Izd-vo Nauka, 1964, 34-40

TOPIC TAGS: high speed steel, R18 high speed steel, steel vacuum
arc melting, vacuum melted steel, vacuum melted steel property

ABSTRACT: R18 high-speed steel was melted in a consumable-electrode
vacuum-arc furnace at 10^{-3} mm Hg. Steel ingots 75 mm in diameter
were furnace cooled, annealed at 830—840C for 2.5 hr, slowly cooled,
and then forged at 950—1150C. Forgings were annealed at 840C for
2.5 hr. Metallographic examination, chemical analyses, and various
tests showed that vacuum-arc melting substantially reduces the con-
tent of nonmetallic inclusions, eliminates chain-like inclusions, and

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lowers oxygen and nitrogen content by 50—60% and 15—30%, respec-
tively. No loss of alloying element was observed except a 15% loss
in the manganese content. Carbide inhomogeneity decreased substan-
tially. Grain size of vacuum-melted steel was smaller, and mechanical
properties were 10—12% higher. No change in red hardness was ob-
served. At a cutting speed of 30 m/min, the wear of vacuum-melted
steel tools remained the same as that of conventionally melted steel,
but at 50, 60, or 70 m/min the speed was found to be somewhat lower.
Orig. art. has: 9 tables.

ASSOCIATION: none

SUBMITTED: 18May64   ATD PRESS: 3117   ENCL: 00

SUBCODE: MM   NO REF SOV: 007   OTHER: 001

Card 2/2

AVERIN, V.V. (Moskva); SAMARIN, A.M. (Moskva)

Thermodynamics of nitrogen solutions in liquid iron. Izv.
AN SSSR Met. i gor. delo no.2:3-12 Mr-Ap'64   (MIRA 17:8)

AUTHOR: Hsu, Chia-lung (Moscow); Polyakov, A. Yu. (Moscow); Samarin, A. M. (Moscow)

TITLE: The influence of a vacuum on increasing the reduction capacity of carbon in iron-carbon melts

SOURCE: AN SSSR. Izv. Metallurgiya i gornoye delo, no. 2, 1964, 17-25

TOPIC TAGS: reducing capability, carbon, iron, carbon monoxide, argon

ABSTRACT: The authors studied possible limits of equilibrium shift of the reciprocal reaction of carbon and oxygen dissolved in liquid iron by lowering the partial carbon monoxide pressure above the liquid metal by means of diluting it with an inert gas and maintaining the total pressure of the gas mixture in the furnace atmosphere close to 1 atmos. It is expedient to investigate the effect of lowering the partial monoxide pressure above the liquid tank, as well as bubbling an inert gas through it. The results in both cases compared with samples of metal obtained under vacuum melting conditions. The authors concluded that: the study of equilibrium conditions of the reciprocal reaction of carbon and oxygen dissolved in liquid iron under various partial pressures of carbon monoxide in gaseous phase and under general pressure of the gas mixtures $p_{CO} + p_{Ar}$ is on the order of 1 atmos. It was established that a

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ACCESSION NR: AP4029830

a decrease in the values of p_{CO} in the gaseous phase is accomplished by an equilibrium shift in the direction of increasing the reduction capacity of carbon, similar to a melt under vacuum conditions. The degree of the thermodynamic factor (p_{CO} above the tank) is defined by the value of the specific surface of the division liquid metal-gaseous phase, the degree of roughness of the crucible walls' infusible lining, and other specific conditions of the experiment. Bubbling an inert gas through a metal increases the reduction capacity of carbon in liquid alloys within the same limits as a vacuum melt. For iron-carbon alloys containing more than 1% carbon, the degree of deoxidation was higher in comparison with the melt under vacuum conditions. Orig. art. has: 2 tables, 5 figures and 6 formulas.

ASSOCIATION: none

SUBMITTED: 03May63   DATE ACQ: 30Apr63   ENCL: 00

SUB CODE: ML   NO REF SOV: 005   OTHER: 000

Card 2/2

BURTSEV, V.T.   (Moskva) KOREMAN, Yu.I. (Moskva); SAMARIN, A.M. (Moskva)

Kinetics of the removal of sulfur compounds during the vacuum
treatment of iron-carbon melts. Izv. AN SSSR Met. i gor. delo
no.3:58-62 My-Je'64   (MIRA 17:7)

LEVENETS, N.P.; SAMARIN, A.M.; SEMIKIN, I.D.; KAZAKOV, V.E.; BEMBINEK, Ye.I.;
PANYUKHNO, L.G.; SVINOLOBOV, N.P.; AVERIN, S.I.; SMIRNOV, V.M.;
ZELENSKIY, V.D.; LAYKO, B.G.; TISHCHENKO, O.I.; OKHRIMOVICH, B.P.;
DANILOV, A.M.; TISHKOV, Yu.Ya.; PANOV, M.A.; MARKELOV, A.I.;
PETROV, A.K.; VASILEVSKIY, P.A.; PASYUK, K.I.; NESTEROV, V.I.;
KHRUSTAL'KOV, L.A.; GLAZKOV, V.S.; MAKAGON, V.G.; FOMIN, G.G.;
TRISHCHENKO, V.D.; KORZH, V.P.; SUYAROV, D.I.; ARSEYEV, A.V.;
PAVLYUCHENKO, A.A.; ZHADAYEV, V.G.; KONDORSKIY, R.I.; MOROZOVA,
I.A.; KOCHETOV, V.V.; PRUZHINER, V.L.; MALEVICH, I.A.;
MALIOVANOV, D.I.; ZAKOVRYASHIN, I.I.; NOVSKIY, I.S.; NOVIKOVA,
V.P.; GRISHIN, K.N.; MOSKOVSKAYA, M.L.; KORNEYEV, B.M.

Inventions. Met. i gornorud. prom. no.3:75-76 My-Je '64.
(MIRA 17:10)

L 11335-65   EPA(s)-2/EWT(m)/EPF(n)-2/EWA(d)/EWP(t)/EWP(b)   Pt-10/Pu-4   MJW/
JD/JW/JG
ACCESSION NR: AP4043916   S/0279/64/000/004/0047/0051

AUTHOR: Volkov, S. Ye.(Moscow); Linchevskiy, B. V. (Moscow);
Polyakov, A. Yu. (Moscow); Samarin, A. M. (Moscow)   B

TITLE: Use of solid slag reagents for desulfuring metal in vacuum
induction furnaces

SOURCE: AN SSSR. Izv. Metallurgiya i gornoye delo, no. 4, 1964,
47-51

TOPIC TAGS: 1Kh18N9, stainless steel, ShKh15 ball bearing steel,
steel vacuum induction melting, metal desulfurization, steel desul-
furization, stainless steel desulfurization, ball bearing steel de-
sulfurization

ABSTRACT: Experiments have been conducted to determine the effective-
ness of solid slag-forming desulfurizers, such as lime, a mixture of
fluorspar and alumina, lime with fluorspar, or lime with fluorspar
and quartz sand, in vacuum induction melting of 1Kh18N9 stainless
steel and ShKh15 ball-bearing steel. Best results were obtained with
a lime + 10% fluorspar mixture, which had a grain size of 2--5 mm and

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L 11335-65

ACCESSION NR: AP4043916

was used in an amount of 3% of the charge weight and placed on the bottom of the furnace crucible. The sulfur content of the stainless steel dropped from 0.0055--0.030% to 0.002--0.003%. The desulfurization occurs in the first 8--10 min; longer holding causes no additional drop. A fresh mixture must be used for each heat. In the case of ball-bearing steel, prolonged holding of liquid metal in contact with a slag mixture had a beneficial effect. With/holding for 35 min the sulfur content was reduced from an original 0.01% to 0.0015--0.0035%. The use of solid desulfurizers had no adverse effect on the melting process nor on the economic indices of the process. Orig. art. has: 4 figures.

ASSOCIATION: none

SUBMITTED: 21Nov63   ATD PRESS: 3100   ENCL: 00

SUB CODE: MM   NO REF SOV: 003   OTHER: 000

Card 2/2

L 39470-65   EPA(s)-2/EWT(m)/EPF(n)-2/T/EWP(t)/EWP(b)   Pt-10/Pu-4   IJP(c)
ACCESSION NR: AP4047868   JD/WW/JG   S/0279/64/000/005/0003/0009

AUTHOR: Skazin, V.Ye. (Moscow); Volkov, S.Ye. (Moscow); Polyakov, A. Yu. (Moscow);
Samarin, A. M. (Moscow)

TITLE: High purity iron production in an induction vacuum furnace

SOURCE: AN SSSR. Izvestiya. Metallurgiya i gornoye delo, no. 5, 1964, 3-9

TOPIC TAGS: vacuum melting, fluorspar, lime, alumina, carbon concentration,
gas pressure, slag, manganese, silicon, high purity iron, induction vacuum fur-
nace, induction heating

ABSTRACT: A method of melting commercially pure iron was developed in a lab-
oratory vacuum furnace with a 5 kg magnesite crucible. The slag forming mix-
ture consisted of burned lime and fluorspar, however, a lime, fluorspar and
alumina mixture was also tested. The best results were obtained with 90% CaO,
10% CaF_2 and 2 to 5 mm particles (see fig. 1). The optimal quantity for the slag
forming mixture was 3% of the weight of the metal portion in the charge. Bottom
charging is recommended. The process of desulfurization was found to be com-
pleted within 10 to 15 minutes after the melting of the metal occurs. The drastic
decline in the carbon concentration during the coexistence of the liquid and the

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L 39470-65
ACCESSION NR: AP4047868   3

solid phase is followed by a gradual decrease in carbon. The amount of Si and
Mn decreases from 0. 10-0. 25 to 0. 03 to 0. 07% while the metal is in the molten
state. Slag does not cause the contamination of metal in the molten state. Slag
does not cause the contamination of metal with slag particles and furnace
pressures under 1 mm Hg prevent oxidation. Care must be taken to avoid a rise
of the oxygen content above the 0. 004 to 0. 005% range. The nonmetallic inclu-
sions were investigated by N. N. Smirnova under the supervision of Yu. T.
Lukashevich-Duvanova, Doctor of technical sciences. Orig. art. has: 7 figures
and 2 tables.
ASSOCIATION: None

SUBMITTED: 12Mar64   ENCL: 01   SUB CODE: MM

NR REF SOV: 005   OTHER: 002

Card 2/3

L 32912-65   EPA(s)-2/EWT(m)/EPF(n)-2/EWP(t)/EPA(bb)-2/EWP(b)   Pad/Pt-10/Pu-4
IJP(c)   D/WW/HW/JG
ACCESSION NR· AP5001609   S/0279/64/000/006/0075/0080

AUTHOR Hu, Chia-lung Kashin, V. I. Polyakov, A. Yu., Samarin, A. M.

TITLE Investigation of the reducing capacity of carbon in liquid nickel

SOURCE AN SSSR. Izvestiya. Metallurgiya i gornove delo, no. 6, 1964 75-80

TOPIC TAGS liquid nickel, reduction, carbon, deoxidizing

ABSTRACT: The deoxidizing capacity of up to 0.17% carbon (added as Ni-C alloy
containing 1.5% C) in electrolytic liquid nickel was investigated. Tests were
conducted in a CO atmosphere, the metal was brought to temperature and held at
that temperature. The temperature dependence of the equilibrium constant of the
reaction and the interaction between the C and O dissolved in the liquid
nickel:

$$[C] + [O] = CO_r, \quad K = \frac{p_{CO}}{[\%C]f_C[\%O]f_O}$$

can be shown by the equation: $\lg K = 4060/T + 1.766$. In alloys containing up to
0.2% C, the equilibrium concentration of oxygen in liquid Ni-C-O alloys can be

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L 32912-65
ACCESSION NR: AP5001609

found by the relationship

$$\lg[\%O] = -\lg K - \lg[\%C] + 15[\%C]$$

With the given carbon content, the equilibrium concentration of residual oxygen
_ _ _ _ _ _ _ _ lower in liquid nickel than in liquid iron, e g with 0 1% C
_ _ _ _ _ _ _ _ _ _ _ _ _ of the liquid nickel and iron was 1 2

ASSOCIATION: None

SUBMITTED: 04May63   ENCL: 00   SUB CODE: GC

VERTMAN, A.A.; FILIPPOV, Ye.S.; SAMARIN, A.M.

Density of iron alloys with carbon in solid and liquid states.
Izv. vys. ucheb. zav.; chern. met. 7 no.7:19-23 '64
(MIRA 17:8)

1. Institut metallurgii im. Baykova.

L 16006-65   EPA(s)-2/EWT(m)/EPF(n)-2/EWP(t)/EWP(b)   Pad/Pt-10/Pu-4   IJP(c)/AFWL
ACCESSION NR: AP5001943 JD/WW/HW/JG   S/0148/64/000/007/0162/0164

AUTHOR: Filippov, Ye. S.; Vertman, A. A.; Samarin, A. M.

TITLE: Density of Co-C and Ni-C alloys in the solid and liquid states

SOURCE: IVUZ. Chernaya metallurgiya, no. 7, 1964, 162-164

TOPIC TAGS: cobalt base alloy, nickel base alloy, carbon containing alloy, melting, metal property

Abstract: the authors studied the temperature and concentration dependence of density in Co-C and Ni-C alloys in the liquid and solid states, since density is directly related to the change in the structure of a solution. Density polytherms were plotted, and then used to plot isotherms for the $1000-1700^\circ C$ range and to determine the influence of carbon on the volume change taking place on melting. In the range of low concentrations (approximately 0.0%C in the Ni-C alloy and 1.0%C in the Co-C alloy), dissolution of carbon sharply increases decompression of the solution, i.e., in the alloys studied, the bonding forces between like particles surpass those between unlike ones, so that positive deviations from Raoult's law should be expected in Ni-C and Co-C alloys. However, at carbon concentrations below 0.9%, slight negative deviations are observed in the Ni-C system which,

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L 16006-65
ACCESSION NR: AP5001943

at high concentrations, become pronounced positive deviations. Eutectic
Ni-C alloys are characterized by only a slight increase in density with in-
creasing carbon content, as is the Fe-C eutectic. This appears to be due to
the thermal stability of large eutectic "colonies", and indicates the preser-
vation of short-range order in the eutectic melt up to about 1400°C.
Orig. art. has 3 figures.

ASSOCIATION: Institut metallurgii im. Baykova (Institute of Metallurgy)

SUBMITTED: 20Mar64   ENCL: 00   SUB CODE: MM

NO REF SOV: 004   OTHER: 001   JPRS

Card 2/2

VERTMAN, A.A.; IVANOV, D.P.; SAMARIN, A.M.; FILIPPOV, Ye.S.

Changing the density of liquid cast iron by isothermal holding.
Lit.proizv. no.10:30-32 O '64.   (MIRA 18:4)

FILIPPOV, Ye.S.; VERTMAN, A.A.; SAMARIN, A.M.

Apparatus for measuring the density and surface tension of
iron melts. Zav. lab. 30 no.5:620-621 '64.   (MIRA 17:5)

1. Institut metallurgii imeni Baykova.

ACCESSION NR: AP4022716 ·   S/0020/64/155/002/0323/0325

AUTHOR: Vertman, A.A.; Samarin, A. M. (Corresponding member);
        Filippov, Ye.S.

TITLE: The density of iron, nickel and cobalt in solid and liquid
       state.

SOURCE: AN SSSR. Doklady*, v. 155, no. 2, 1964, 323-325

TOPIC TAGS: iron, cobalt, nickel, density, solid state, liquid state,
fusion temperature, temperature density function, activation energy,
fluidity density function, structure stability, interatomic distance

ABSTRACT: The densities of iron, nickel and cobalt were determined
by the "large drop" method (V.N. Yermenko, Yu.V. Naydich, Fiz. met.
i. metalloved., No. 6, 883 (1961)) to obtain more accurate data than
presently available (fig. 1). It is proposed that the increase in
density in the proximity of the fusion temperatures of the metals is
caused by the evolution of gases on fusion. The temperature-density
function of the metals in the liquid state, calculated for the equa-
tion $\Delta V = A \exp(B/RT)$, where B is the energy of activation, is shown

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ACCESSION NR: AP4022716

in fig. 2. The break in the curve for Fe is caused by a transition
to the gamma-iron structure. The fluidity-density relationship
according to the formula $1/v = a - b/\rho$ (ρ = density, a and b are
constants) is a straight line function. The deviation (fig. 3)
shows the structures do not remain constant and is associated with the
atoms aligning to the structure of the solid phase. Calculations
were made to show that the structure of Ni is the most stable with
respect to temperature change. Interatomic distances were calculated
from the densities for Ni, Co, and Fe in the liquid state. Orig.
art. has: 2 tables, 3 figures and 4 equations.

ASSOCIATION: Institut metallurgii im. A. A. Baykova (Institute of
              Metallurgy)

SUBMITTED: 15Oct63   DATE ACQ: 08Apr64   ENCL: 02

SUB CODE: ML   NR REF SOV: 005   OTHER: 007

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L 18224-65   EWG(j)/EWP(e)/EWT(m)/EPF(c)/EPR/T/EWP(t)/EWP(b)   Pr-4/Pe-4   IJP(c)

WH/JD/WW   S/0020/64/159/001/0121/0124

ACCESSION NR: AP4049137

AUTHORS: Vertman, A. A.; Grigorovich, V. K.; Nedumov, N. A.; Samarin, A. M.
(Corresponding member AN SSSR)   B

TITLE: Investigations in the region beyond the eutectic point of the iron-carbon system (2.88 to 27% C by weight)

SOURCE: AN SSSR. Doklady*, v. 159, no. 1, 1964, 121-124, and insert facing p. 115

TOPIC TAGS: iron alloy, carbon alloy, eutectic alloy, phase diagram / PMT 3 microhardness tester

ABSTRACT: Iron alloys containing 2.88-26.5% carbon by weight were experimentally investigated. The alloys were prepared from electrolytic vacuum-remelted iron and pure graphite in an induction furnace. The limiting carbon content was obtained in less than five minutes at temperatures below 2400C by melting iron cylinders in covered carbon crucibles. Alloys containing more than 6.7% carbon were obtained by keeping carbon-saturated alloys at 2400-2500C for extended periods of time. The samples underwent microstructure analysis (after etching with HNO_3 in alcohol) and x-ray structural analysis. All components were tested

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L 18224-65
ACCESSION NR: AP4049137

for microhardness with a PMT-3 tester. The experimental data were used to con-
struct the complete diagram for the iron-carbon system (to 100% carbon with the
vapor phase), as shown in Fig. 1 on the Enclosure. Orig. art. has: 1 table and
1 figure.

ASSOCIATION: Institut metallurgii im. A. A. Baykova (Metallurgy Institute)

SUBMITTED: 24Jul64   ENCL: 03

SUB CODE: MM   NO REF SOV: 003   OTHER: 003

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L 18224-64
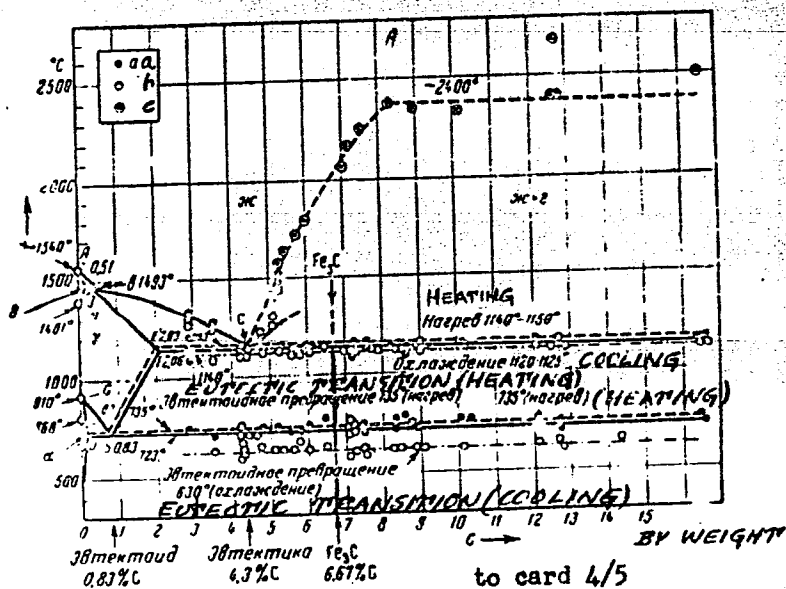
ENCLOSURE: 01

Card 3/5

L 18224-65

ACCESSION NR: AP4049137
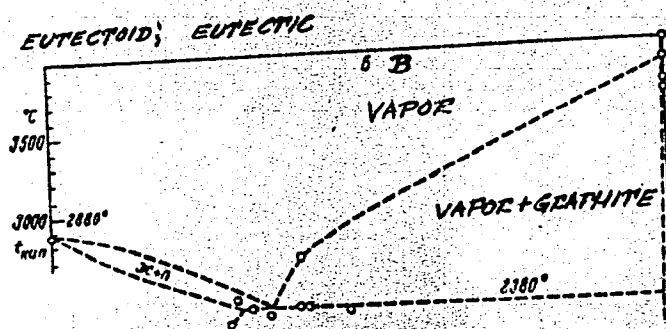
to card 3/5

Card 4/5

L 18224-65
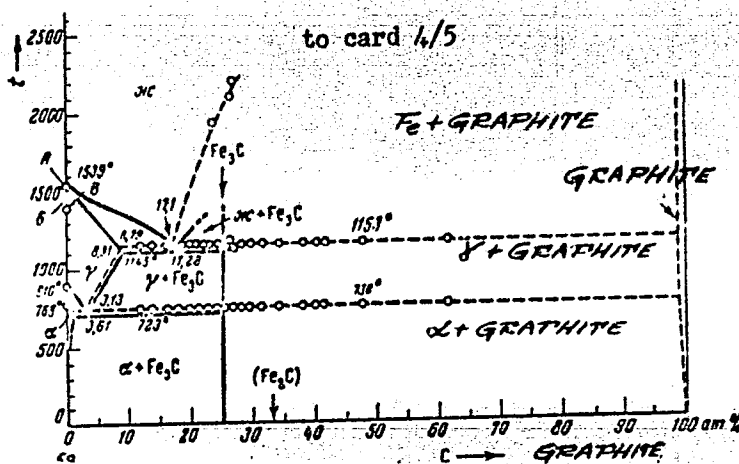
Fig. 1. Phase diagrams of iron and carbon alloys: A - by weight percent (from 2.88-26.5%, using data of present work), a and b - thermal analysis: heating (a) and cooling (b); c - solubility of C; B - complete diagram in atomic percentages.

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SAMARIN, A.M., otv. red.; PRIKLONSKIY, A.A., red.

[Problems of major metallurgical processes and the
physical chemistry of new alloys; on the 100th an-
niversary of Academician M.A.Pavlov's birth] Problemy
bol'shoi metallurgii i fizicheskoi khimii novykh spla-
vov; k 100-letiiu so dnia rozhdeniia akad. M.A.Pavlova.
Moskva, Nauka, 1965.   326 p.   (MIRA 18:7)

1. Akademiya nauk SSSR. Institut metallurgii. 2. Chlen-
korrespondent AN SSSR (for Samarin).

VERTMAN, A.A.(Moskva); SAMARIN, A.M. (Moskva)

Kinetics of the dissolution of carbon in liquid iron. Izv. AN
SSSR. Met. no.1:46-54 Ja-F '65.   (MIRA 18:5)

BURTSEV, V.T. (Moskva); KARASEV, R.A. (Moskva); POLYAKOV, A.Yu. (Moskva);
     SAMARIN, A.M. (Moskva)

Investigating with the help of a mass-spectrometer, the products
of the decarburization reaction during the smelting of iron in
vacuum. Izv. AN SSSR. Met. no.1:55-58   Ja-F '65.   (MIRA 18:5)

VOLKOV, S.Ye. (Moskva); LEVENETS, N.P. (Moskva); SAMARIN, A.M. (Moskva)

Combined effect of phosphorus and oxygen on the surface tension
of liquid iron. Izv. AN SSSR. Met. no.1:71-77 Ja-F '65.   (MIRA 18:5)

BURTSEV, V.T.; VERTMAN, A.A.; SAMARIN, A.M.; FILIPP, G.

Kinetics of gas liberation during the inoculation of liquid
cast iron. Lit. proizv. no.3:25-27 Mr '65.   (MIRA 18:6)

VOLKOV, S.Ye.; LINCHEVSKIY, B.V.; POLYAKOV, A.Yu.; SAMARIN, A.M.

Desulfuration   of steel in vacuum induction furnaces. Stal'
25 no.2:129-132 F '65.   (MIRA 18:3)

BURTSEV, V.T.; FILIPP, G.L.; POLYAKOV, A.Yu.; SAMARIN, A.M.

Studying the kinetics of gas liberation in the vacuum treatment of liquid iron. Zav. lab. 31 no.1:80-33 '65.

(MIRA 18:3)

1. Institut metallurgii imeni Baykova.

L 63626-65   EWP(z)/EWA(c)/EWT(m)/EWP(b)/T/EWP(t)   Pad   IJP(c)   JD/HW

ACCESSION NR: AP5017209   UR/0020/65/162/006/1304/1305

AUTHOR: Vertman, A. A.; Grigorovich, V. K.; Nedumov, N. A.; Samarin, A. M.

TITLE: A study of the systems cobalt - carbon and nickel - carbon

SOURCE: AN SSSR. Doklady, v. 162, no. 6, 1965, 1304-1305

TOPIC TAGS: cobalt alloy, nickel alloy, carbon alloy, carbide formation, phase
diagram

ABSTRACT: The Co-C and Ni-C alloys were prepared from cobalt (98.5%) and nickel
(99.8%) and saturated with carbon in crucibles of pure graphite under isothermal
conditions. The structure of the alloys and their phase composition were
studied by examining the microstructure and measuring the microscopic hardness of
the structural components. The temperature of the phase transformations was de-
termined by thermal analysis. A eutectic consisting of graphite and a solid solu-
tion of carbon in cobalt is formed at 12 at.% C and 1320C; the eutectic horizontal
was traced up to 57.1 at.% C. Quenching of the alloys in water from the liquid
state freezes a carbide eutectic consisting of Co_3C and a solid solution of carbon
in cobalt. The latter is unstable and decomposes on heating to 300-350C, and for

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L 63626-65

ACCESSION NR: AP5017209

this reason the system Co - Co$_3$C is highly metastable. The system Ni - C was studied up to 69.2 at.% C. It shows the presence of a eutectic horizontal up to 69.2 at.% C. In quenched alloys, the eutectic Ni - Ni$_3$C is present which converts into a graphite eutectic on heating. The carbides Co$_3$C and Ni$_3$C are less stable than Fe$_3$C and decompose even in the solid state; for this reason, they cannot exist in alloys rich in carbon. Phase diagrams of the Co - C and Ni - C systems were plotted. Orig. art. has: 2 figures and 1 table.

ASSOCIATION: Institut metallurgii im. A. A. Baykova (Institute of Metallurgy)

SUBMITTED: 07Jan65   ENCL: 00   SUB CODE: SS, MM

NO REF SOV: 002   OTHER: 000

KC
Card   2/2

L 63762-65   EPA(s)-2/EWT(m)/EPF(n)-2/EWP(t)/EWP(z)/EWP(b)   IJP(c)   JD/WW/HW/JG

ACCESSION NR: AP5018092   UR/0020/65/163/001/0166/0168

AUTHOR: Tarakanov, Yu. V.; Cherkasov, P. A.; Averin, V. V.; Samarin, A. M.
(Corresponding member AN SSSR)

TITLE: Effect of chromium on the deoxidizing capacity of silicon in nickel
and chromium melts

SOURCE: AN SSSR. Doklady, v. 163, no. 1, 1965, 166-168

TOPIC TAGS: deoxidizing capacity, nickel containing melt, chromium containing
melt, silicon, oxide phase, oxidation potential, activity coefficient, melt
deoxidation

ABSTRACT: The effect of chromium on the deoxidizing capacity of silicon in
melts of nickel and chromium was determined with the aid of a previously
described technique (V. V. Averin, P. A. Cherkasov, A. M. Samarin. Tr. inst.
metallurgii, 11, Izd. AN SSSR, 1962, p 36) for investigating the equilibrium
between the melts, the oxide phase, and a steam-hydrogen mixture with known
oxidation potential. The deoxidizing capacity of silicon was determined at
1600°C in Ni melts containing 5, 10, 15 and 20% Cr; the concentration of Si

Card   1/3

L 63762-65

ACCESSION NR: AP5018092

ranged from 0.1 to 2.0%. Electrolytic nickel and chromium, pure silicon, and zirconium-dioxide crucibles were used in this investigation. Fig. 1 shows the solubility of oxygen as a function of Si content in a Fe alloy containing 20% Cr and in pure nickel: it can be seen that the solubility of oxygen decreases with increasing content of silicon in the melts. The effect of silicon on the activity of oxygen, determined on the basis of these findings, was found to decrease with increasing content of Cr in the melt (Fig. 2): this effect reaches its maximum for a Ni melt containing 5% Cr, whereas in a Ni melt containing 20% Cr silicon virtually does not affect the activity of oxygen. By contrast, the activity coefficient of silicon increases with increasing concentration of Cr, since the presence of Cr weakens the strength of the bonding between Si and Ni. The method of calculating the activity coefficient of Si, also described previously by the authors (see bibl. ref. above), can be used when the concentration of Si is such as to condition the formation of the oxide phase (products of the deoxidation reaction), which entirely consists of silica. However, the concentration of Si required for this purpose varies as a function of the concentration of Cr. For example, in a Ni-Si melt containing more than 0.1% Si the deoxidation product is pure silica, whereas the addition of 5% Cr to the molten Ni causes the appearance of silica in the presence of as little as 0.25-

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L 63762-65

ACCESSION NR: AP5018092

0.30% Si. Orig. art. has: 1 table, 2 figures.

ASSOCIATION: none

SUBMITTED: 22Dec64   ENCL: 02   SUB CODE: MM, GC

NO REF SOV: 002   OTHER: 000

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L 63762-65

ACCESSION NR: AP5018092

ENCLOSURE: 01
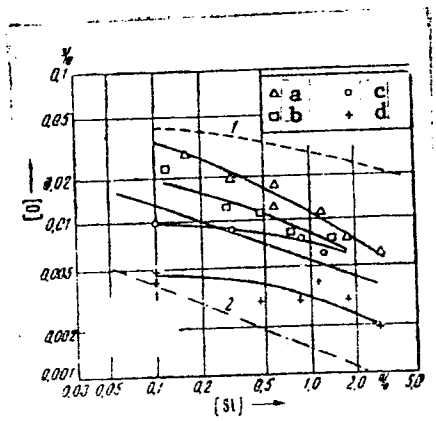
Fig. 1. Solubility of oxygen in melts of nickel and chromium as a function of the content of silicon.

a - 20% Cr
b - 15% Cr
c - 10% Cr
d - 5% Cr
1 - Fe-Cr (20%)-Si
2 - Ni-Si
3 - Fe-Si

Card   4/5

ENCLOSURE: 02
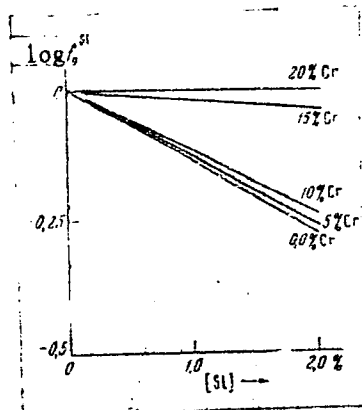
Fig. 2. Activity coefficient of silicon as a function of the concentration of silicon in nickel-chromium melts

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VERTMAN, A.A.; GRIGOROVICH, V.K.; NEDUMOV, N.A.; SAMARIN, A.M.

Hypereutectic part of the iron-carbon constitutional diagram.
Lit. proizv. no.2:27-33 F '65.   (MIRA 18:6)

TOPURIYA, M.D. (Moskva); KASHIN, V.I. (Moskva); SAMARIN, A.M. (Moskva)

Production methods and the properties of iron-aluminum alloys.
Izv. AN SSSR. Met. no.5:121-123 S-O '65.

(MIRA 18:10)

CHERKASOV, P.A.; AVERIN, V.V.; SAMARIN, A.M.

Deoxidizing capacity and activity of silicon in cobalt-chromium alloys. Dokl. AN SSSR 164 no.6:1355-1357 O '65.

(MIRA 18:10)

1. Institut metallurgii im. A.A.Baykova, Moskva. 2. Chlen-korrespondent AN SSSR (for Samarin).

FILIPPOV, Ye.S.; SAMARIN, A.M.

Determining the short-range order structure of liquid binary alloys.
Dokl. AN SSSR 165 no.1:85-87 N '65.   (MIRA 18:10)

1. Institut metallurgii im. A.A.Baykova.   2. Chlen-korrespondent
AN SSSR (for Samarin).

L 11203-66   EWT(m)/EWP(w)/T/EWP(t)/EWP(b)   JD

ACC NR: AP5026359   SOURCE CODE: UR/0370/65/000/005/0121/0123

AUTHOR: Topuriya, M. D. (Moscow); Kashin, V. I. (Moscow); Samarin, A. M. (Moscow)

ORG: none

TITLE: Properties of iron-aluminum alloys and smelting methods

SOURCE: AN SSSR. Izvestiya. Metally, no. 5, 1965, 121-123

TOPIC TAGS: iron aluminum alloy, aluminum containing alloy, induction furnace, smelting furnace, vacuum furnace, iron containing alloy, MAGNETIC PROPERTY, OXYGEN, ALLOY COMPOSITION

ABSTRACT: The effect of the smelting method on the composition of iron-aluminum alloys was investigated. Fe-Al alloys containing 14-17% Al and small concentrations of C, S, O_2, N_2, Si, Mn, and P were smelted in open induction, vacuum induction, and induction furnaces in hydrogen, helium, and argon atmospheres. The conditions of smelting operation in terms of temperature, duration and cooling rate varied widely. Smelting in the open induction furnace yielded alloys with a 0.002-0.009% oxygen content. Substantially smaller oxygen content (10-40%) was found in alloys smelted in the vacuum induction furnace. Induction furnace smelting in helium, argon, and hydrogen atmospheres produced the highest alloy purity (alloys with the lowest content of S, N_2, and O_2). It was found that thermomechanical working exerted a profound effect on the magnetic properties of the alloys.

SUB CODE: 11/   SUBM DATE: 00/   ORIG REF: 000/   OTH REF: 000

Card 1/1   melting   UDC: 669.15'71.046

L 15255-66   EWT(m)/EPF(n)-2/T/EWP(t)/EWP(z)/EWP(b)   IJP(c)   JD/WW/HW/JG
ACC NR: AP5027840   SOURCE CODE: UR/0020/65/165/001/0085/0087

AUTHOR: Filippov, Ye. S.; Samarin, A.M. (Corresponding member AN SSSR)

ORG: Institute of Metallurgy im. A.A. Baykov (Institut metallurgii)

TITLE: An estimate of short range order structures in liquid binary metal alloys

SOURCE: AN SSSR. Doklady, v. 165, no. 1, 1965, 85-87

TOPIC TAGS: liquid metal, iron alloy, grain structure

ABSTRACT: Whereas the local order structure of pure liquid metals is quite well known, this is not the case with liquid alloys. However, the coordination number characterizing the local order of atoms may be estimated, as in the case of liquid metals, from the temperature dependence of the liquid alloy density. The present analysis is carried out on the basis of data published earlier. It is summarized in Fig. 1. Elements which widen or stabilize the δ or γ regions of solid iron solutions stabilize in liquid solutions the local order structures << δ >> (coordination number ~ 8) and << γ >> (c.n. ~ 12), respectively. Orig. art. has: 3 figures.

SUB CODE: 11 / SUBM DATE: 14Jun65 / ORIG REF: 006

Card 1/2   UDC: 669.14:669.15

L 15255-66
ACC NR: AP5027840

Fig. 1. The determination of the short
range order structures of liquid alloys
of iron. Complete stabilization $<<\delta>>$
of the local order structure. a - Fe-Cr;
b - Fe-Mo; c - Fe-Si; d - Fe-Al; e -
Fe-V; f - Fe-S. Complete stabilization
of the $<<\gamma>>$ structure: g - Fe-PT;
h - Fe-Mn; i - Fe-Cu. Partial stabil-
ization of the $<<\delta>>$ and $<<\gamma>>$ local
orders structure: j - Fe-Ni; k - Fe-
Co; l - Fe-C; m - Fe-P (local order
structure of Fe$_2$P); m - Ni-C; o - Co-C.
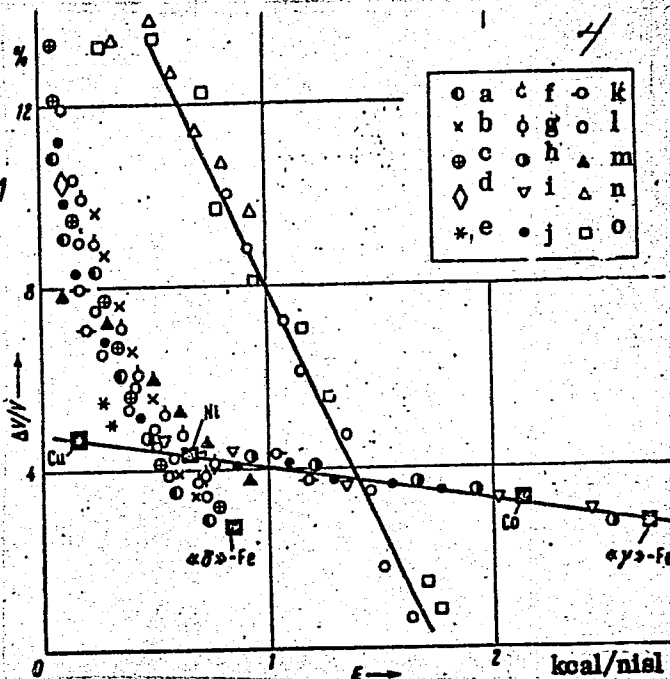
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BURTSEV, V.T. (Moskva); GLEBOVSKIY, V.G. (Moskva); POLYAKOV, A.Yu. (Moskva); SAMARIN, A.M. (Moskva)

Sulfur and oxygen distribution between iron and limestone-alumina slag during suspension smelting. Izv. AN SSSR. Met. no.6:24-27 N-D '65.   (MIRA 19:1)

1. Submitted February 13, 1965.

L. 36118-66   EWT(m)/T/EWP(t)/ETI   IJP(c)   JD/GD
ACC NR: AT6016940   (N)   SOURCE CODE: UR/0000/65/000/000/0087/0096

AUTHORS: Filipp, G. I., Burtsev, V. T.; Polyakov, A. Yu.; Samarin, A. M. 57

ORG: None   B+1
                            27   27
TITLE: Degassing of iron carbide melts in vacuum
                        18
SOURCE: AN SSSR. Institut metallurgii. Protsessy vosstanovleniya i plavleniya
zheleza (Processes of reduction and melting of iron). Moscow, Izd-vo Nauka,
1965, 87-96

TOPIC TAGS: Vacuum degassing, iron base alloy, gas kinetics, carbide /MKh-13-02
mass spectrophotometer ,D   27

ABSTRACT: Quantity and composition of gases evolved during evacuation of iron
carbide melts and subsequent deoxidation with silicon, manganese, and aluminum
have been investigated. The amount of the evolved gases was determined at con-
stant pressure by means of a rheometer, and the gaseous samples were analyzed
on a mass spectrophotometer MKh-13-02. The diagrams of the experimental set-
up and vacuum induction furnace are shown, and the composition of the metal,
specific gas evolution, and composition of the extracted gas are tabulated.
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L 36118-66
ACC NR: AT6016940
Specific gas evolution from iron carbide as function of the carbon content ◯
and method of reduction are illustrated in Fig. 1. The kinetics of the re-
moval of various gases under various conditions is also illustrated. Specific
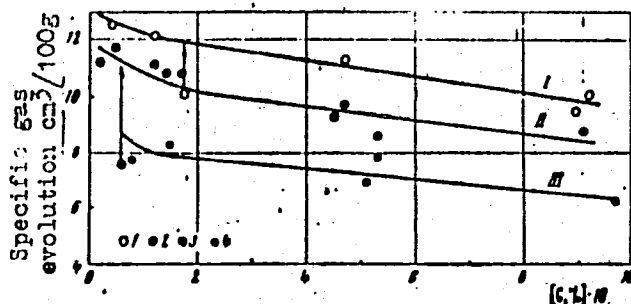gas evolution from Fe-C-O melt at 1873K and 0.01--0.2 mm

Fig. 1. Specific gas evolution of iron carbide melt at 1873C
and 0.01--0.02mm, as function of carbon content and reduction:
1- no reduction; 2 - reduction with 0.4% Mn; 3 - reduction with
0.4% Mn + 0.2% Si; 4 - reduction with 0.4% Mn + 0.2% Si + 0.1% Al;
(Time of gas sampling: I - at melting; II - in 5 min; III - in 10
min after melting.)

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ACC NR: AT6016940   O

changes in the interval of C content 0.005—1.0% from 9.70 to 12.51 $cm^3/100g$, decreasing proportionally with an increased C content. Specific gas evolution of such melts deoxidized by Si, Mn, or Al is decreased 1.5 times. The rate of degassing of the metal melted in crucibles is 1.5 to 2 times higher than when it is melted in a suspension. Orig. art. has: 6 figures and 2 tables.

SUB CODE: 20/ SUBM DATE: 27 Sep 65/ ORIG REF: 008/ OTH REF: 002

3/3 egh

L 34360-66   EWT(m)/EWP(t)/ETI   IJP(c)   JW/JD/HW/JG

ACC NR: AP5027233   (A)   SOURCE CODE: UR/0020/65/164/006/1355/1357

AUTHOR: Cherkasov, P. A.; Averin, V. V.; Samarin, A. M. (Corresponding member, AN SSSR)

ORG: Institute of Metallurgy im. A. A. Baykov (Institut metallurgii)

TITLE: Deoxidizing capacity and activity of silicon in cobalt-chromium melts

SOURCE: AN SSSR. Doklady, v. 164, no. 6, 1965, 1355-1357

TOPIC TAGS: silicon, metal oxidation, cobalt, chromium, oxygen, solubility, metal melting

ABSTRACT: Experimental data, obtained during an investigation of the solubility of oxygen in Co-Cr melts containing Si proved the dependence of oxygen solubility on the content of Si: an increase in concentration of Si decreased the solubility of oxygen both in Co and Co-Cr melts. An increase in the content of Si in the Co-Cr melts caused a decrease in value of the oxidation potential of the gas phase present in equilibrium with the metal and oxide phase. The value of the oxidation potential depended on the content of Cr in the melt: the higher the content of Cr the lower the value of the oxidation potential. This indicated that the activity of Si (at the same concentration) was higher in melts having a higher concentration of Cr, because its oxidation occurred at a lower partial pressure of oxygen. The coefficient of activity of Si was determined by comparing the thermodynamic conditions of Si oxidation in Co-Cr melts with those in

UDC: 669.255

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•ACC NR: AP5027233

the pure Si. The value of the coefficient of activity of Si was determined from the equation log γ_{Si} = log K - log K', where log K is 7.14 at 1600C, according to J. P. Coughlin (U.S. Bureau Mines Bull., Washington, No. 542, 1954). The values of log K' were constant for each melt at a concentration of 0.3 - 1% Si, but they decreased with increased Cr content in the melt. The coefficients of activity of Si for melts containing 5, 10, 15, and 20% were determined as 3.2×10^{-3}, 5×10^{-3}, 1×10^{-2}, and 1.6×10^{-2} respectively. The low activity of Si in the Co-Si melts, therefore, increased considerably in the presence of Cr. Orig. art. has: 4 fig., 1 formula, and 1 table.

SUB CODE: 11/ SUBM DATE: 07Jul65/ ORIG REF: 004/ OTH REF: 001

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L 37733-66   EWT(m)/EWP(k)/EWP(t)/EWP(e)/ETI   IJP(c)   JD/JG

ACC NR: AP6017104   (A)   SOURCE CODE: UR/0226/66/000/001/0050/0054

AUTHORS: Burtsev, V. T.; Vasyukov, G. Kh.; Kashin, V. I.; Samarin, A. M.

ORG: Institute of Metallurgy im. A. A. Baykov (Institut metallurgii)

TITLE: Liberation of gas from tungsten at 2500C

SOURCE: Poroshkovaya metallurgiya, no. 1, 1966, 50-54

TOPIC TAGS: tungsten, powder metal, powder metal compaction, powder metal sintering, VACUUM DEGASSING, CARBON MONOXIDE, HYDROGEN

ABSTRACT: The nature and quantity of gas liberated at 2500C from sintered and vacuum cast tungsten were determined by mass spectrometry. A schematic of the vacuum furnace and the experimental installation is presented. The detailed description of the experimental apparatus and procedure is given by V. T. Burtsev, Yu. I. Korbman, and A. M. Samarin (Izv. AN SSSR, Metallurgiya i gornoye delo, No. 3, 58, 1964). The experimental results are presented in graphs and tables (see Fig. 1). Vacuum smelting of tungsten by electron-beam techniques is the most efficient procedure for the removal of residual gases from the metal. It is suggested that sintered tungsten bars should be subjected to a preliminary degassing treatment in vacuum resistance furnaces.
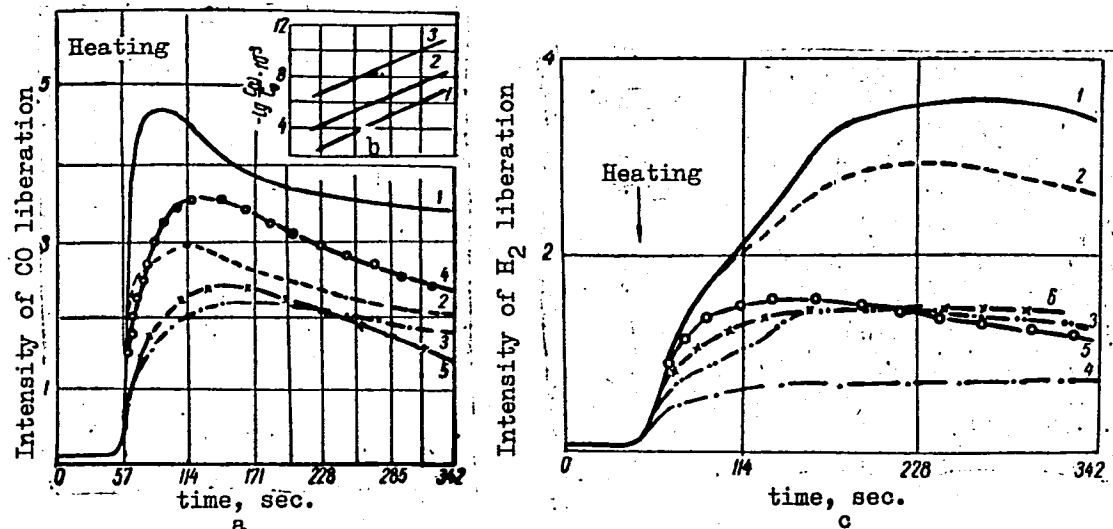
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Fig. 1. Kinetics of the liberation of carbon monoxide (a and b) and hydrogen from tungsten at 2500C and 10^{-3} mm Hg as a function of the nature and type of treatment of specimens: (a and b): 1 - sintered, 2 - vacuum smelted in arc furnace, 3 - vacuum smelted in electron-beam furnace, 4, 5 - bar after 3 and 6 hours annealing; (c): 1 - sintered, 2, 3 - first and second smelting in arc furnace, 4 - electron-beam smelting, 5 and 6 - bar after 3 and 6 hours annealing.   Orig. art. has: 3 figures and 1 table.

Card 2/2   SUB CODE: 11/ SUBM DATE: 27May65/   ORIG REF: 010

L. ??88-67   EWT(m)/EWP(t)/ETI   IJP(c)   JD/HW/JG
ACC NR: AP6030660   (A)   SOURCE CODE: UR/0020/66/169/006/1383/1386

AUTHOR: Averin, V. V.; Cherkasov, P. A.; Samarin, A. M. (Academician)

ORG: Institute of Metallurgy im. A. A. Baykov, Academy of Sciences SSSR (Institut
metallurgii Akademii nauk SSSR)

TITLE: Solubility of nitrogen in liquid cobalt and cobalt-titanium and cobalt-molybde-
num melts

SOURCE: AN SSSR. Doklady, v. 169, no. 6, 1966, 1383-1386

TOPIC TAGS: solubility, solution property, free energy, nitrogen, cobalt, titanium,
molybdenum, alloy

ABSTRACT: Solubility of nitrogen in liquid cobalt and in cobalt-titanium--(0.25-1.3%
Ti) and cobalt-molybdenum--(5-20% Mo) melts was studied by means of measuring the vol-
ume of the hot melt after dissolving nitrogen in 1500-1700°K range and at nitrogen
pressure of 15-760 mm Hg. The volume of the hot melt was measured with argon and the
nitrogen solubility was calculated according to the method of R. D. Pehlke and I. F.
Elliott (Trans. AIME, 218, 1088 (1959). The experimental setup is described in detail.
The nitrogen solubility in molten cobalt at 1 atm pressure was found to obey the re-
lationship $\log [\%N] = 3540/T - 0.435$. The free energy of the nitrogen dissolving in
molten cobalt was found to be: $\Delta F = 16,200 + 1.99\,T$ cal/gram-atom of nitrogen. At

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ACC NR: AP6030660 ∂

1600°K, the dependence of the coefficient of nitrogen activity upon titanium concentration in the cobalt-titanium melts was found to be:

$$\lg f_N^{Ti} = -0,45[\%\,Ti].$$

The effect of molybdenum on nitrogen activity in the Co-Mo melts at 1600°K was found to be

$$\lg f_N^{Mo} = -0,015[\%\,Mo].$$

A. M. Zelichenko took part in the work. Orig. art. has: 4 figures, 6 formulas.

SUB CODE: 11/   SUBM DATE: 28May66/   ORIG REF: 004/   OTH REF: 003

Card 2/2

KEYS, N.V.; SINITSYN, A.A.; POZDNYSHEV, V.M.; SAMARIN, A.P.; YARTSEVA, T.N.;
    Prinimali uchastiye: BENDOVSKIY, B.M.; CHUTCHEV, I.I.; KOMPANIYETS, N.V.;
    OTRISHCHENKO, N.I.; KHARITONOVA, V.V.; TOROPOV, F.S.

    Making ingot molds and other castings of cast iron with spheroidal
    graphite at the Chelyabinsk Metallurgical Plant. Stal' 23 no.4:381-383
    Ap '63.   (MIRA 16:4)
            (Iron founding)   (Ingot molds)

LIVSHITS, B.G.; YELISEYEV, S.A.; SAMARIN, B.A.; SOMENKOV, V.A.

Phase equilibrium in the system Fe_2O_3 - BaO.   Izv. AN SSSR.
Ser. fiz. 25 no.11:1418-1421 N '61.   (MIRA 14:11)
                    (Phase rule and equilibrium)
                          (Iron oxide)
                          (Barium oxide)

39069
S/148/62/000/005/006/009
E202/E492

/{.1} ,°

AUTHORS: Samarin, B.A., Sumin, V.I., Avraamov, Yu.S.

TITLE: Method of determination of Hall constant and its
             application to the studies of ageing

PERIODICAL: Izvestiya vysshikh uchebnykh zavedeniy. Chernaya
            metallurgiya, no.5, 1962, 134-139

TEXT: Hall effect and its changes during the natural ageing of
duraluminium was determined using an apparatus comprising three
circuits: primary current, electromagnet supply and measuring
circuits.   The current in the first and second circuit was
capable of adjustment and reversal, the field produced by the
second circuit being calibrated for the various pole separation.
The measuring circuit comprised the sample with the three Hall
electrodes and a potentiometric compensator, clamped in a frame
with copper jaws.   The Hall emf was measured by means of
electrooptical amplifier $\phi \ni O y$-15 (FEOU-15) the output of which
was fed into a sensitive galvanometer (10^{-8} V/mm).   The relative
error of the Hall coefficient R_X was 5%.   Using the conductivity
data given by H. E. Schmidt (Z.f.Metallkunde, 49, 1958, 113)
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E202/E492

Method of determination ...

the number of conductivity electrons n and their mobility v
were also determined viz:

Sample	$R_x \cdot 10^6$ $cm^3/A \cdot sec$	n per atom	v $cm^2/V \cdot sec$
Al	-36.3	2.86	13.4
Cu	-55.7	1.33	32.8

Natural ageing was studied on duraluminium of the following
composition: 6.12% Cu, 0.7% Mg, 0.49% Si, 0.6% Mn, 0.46% Fe,
ad 100% Al. Samples were cut from 0.2 mm thick ribbon and
additional check on ageing was carried out by sclerometric tests
and measurement of specific (electric) resistance ρ. Within the
first 5 hours R_x, v, Bhn and ρ were increasing while n was
decreasing. All these values remained substantially unchanged
within the next 50 hours. It was concluded that the changes
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Method of determination ...

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occurring during the natural ageing in the supersaturated solid
solution are not related to the deposition of the excess Θ-$CuAl_2$
phase. A feasible explanation offered suggests accumulation of
Cu atoms in 2 or 3 atomic planes which are intrinsically bound
with the solid solution lattice, producing quasichemical bonds
lowering n and increasing v . Consequently, R_x and ρ
increase during ageing proportionately to 1/ne and 1/nev
respectively (where e is the electron charge).
There are 4 figures and 1 table.

ASSOCIATION: Moskovskiy institut stali
           (Moscow Steel Institute)

SUBMITTED: July 11, 1961

Card 3/3

S/148/62/000/007/004/005
E210/335

AUTHORS: Samarin, B.A., Sumin, V.I. and Avraamov, Yu.S.

TITLE: Studies of phase transformations in duralumin alloy
              using the method of the Hall constant determination

PERIODICAL: Izvestiya vysshikh uchcbnykh zavedeniy, Chernaya
              metallurgiya, no. 7, 1962, 140 - 145

TEXT: Experimentation aiming at relating the processes
occurring during artificial ageing of duralumin-type alloy with
the changes in its electronic configuration is described.   Three
types of measurements were made: measurement of the Hall
constant R_H , specific resistance ρ and Brinell hardness; the
results were plotted for varying ageing times and varying ageing
temperatures.   The samples were water-quenched from 490 - 500 $^{\circ}$C
and then subjected to artificial ageing for 0.5 - 10 hours.   The
number of conductivity electrons per atom n and their mobility
V were calculated from the changes in R_H and ρ .   The
resulting v-curves had the same shape as the R_H curves, while
the n-curves appeared as a mirror image of the former curves.
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